Amendments to the Claims

Listing of Claims:

Original claims 1 - 37 (canceled).

Amended claims 1 - 36 (canceled).

Claim 38 (new). A switching device for bidirectional charge transfer between an energy accumulator and an electrical load/generator in an electrical system, comprising:

a first terminal coupled to the load/generator;

a second terminal coupled to an energy source;

a controllable transfer gate formed with a first load current carrying path connected between said first and second terminals, said transfer gate having a parallel circuit of a plurality of series circuits each formed of two series-connected controllable power transistors; and

a controllable switching controller capable of being operated bidirectionally, said switching controller including a second load current carrying path connected between said first and second terminals and in parallel with said first load current carrying path.

Claim 39 (new). The switching device according to claim 38, wherein the electrical system is a motor vehicle on-board electrical system, the energy accumulators are capacitive energy accumulators, and the electrical load/generator is an integrated starter-generator.

Claim 40 (new). The switching device according to claim 38, wherein said switching controller is a stepdown controller.

Claim 41 (new). The switching device according to claim 38, wherein said switching controller includes at least two controllable first switches having controlled

paths connected in series with one another, an inductive energy accumulator connected between a relevant first load connection of said first switch and connected in each case to a terminal of said inductive energy accumulator via a free-wheeling diode to a supply terminal for a supply potential.

Claim 42 (new). The switching device according to claim 41, wherein said first switches are current-sensing transistors.

Claim 43 (new). The switching device according to claim 42, wherein said first switches are sense MOSFETs.

Claim 44 (new). The switching device according to claim 38, wherein said transfer gate includes a parallel circuit formed of controllable second switches, with two of said second switches having controlled paths connected in series and defining a load path in each case, with control terminals of said second switch connected to each other, with first load connections of said second switch connected to each other, and with second load connections of said second switches connected either to said first terminal or to said second terminal.

Claim 45 (new). The switching device according to claim 44, wherein said first and/or said second switches are power switches.

Claim 46 (new). The switching device according to claim 45, wherein said first and/or said second switches are power MOSFETs.

Claim 47 (new). The switching device according to claim 46, wherein said first and/or said second switches are n-channel power MOSFETs.

Claim 48 (new). The switching device according to claim 44, wherein said first switches and/or said second switches have source terminals forming first load terminals and drain terminals forming second load terminals.

Claim 49 (new). The switching device according to claim 44, wherein said transfer gate includes a gate protection circuit, connected between said control terminals and said first load terminals of said second switches and configured to protect said control terminals of said second switches from an overvoltage.

Claim 50 (new). The switching device according to claim 44, wherein said transfer gate includes a switch-off device, and said switch-off device, for switching off said transfer gate, short-circuits said control terminals and said first load terminals of said second switches and thereby switches off said second switches.

Claim 51 (new). The switching device according to claim 44, which comprises a switchable oscillator for activation of said second switches a switchable oscillator, and a charge pump connected downstream of said oscillator for activating said control terminals of said second switches with a control signal.

Claim 52 (new). The switching device according to claim 51, wherein said oscillator is a Schmitt trigger circuit.

Claim 53 (new). The switching device according to claim 44, which comprises at least one current sensing device connected to at least one of said first switches and configured to tap off a signal derived from the current through said load path of the respective said first switch and, in dependence thereof, to provide a current sensing signal at an output of said current sensing device.

Claim 54 (new). The switching device according to claim 38, which comprises a scheduler circuit configured to control a function of said switching controller and of said transfer gate.

Claim 55 (new). The switching device according to claim 54, which comprises at least one gate control circuit having an input connected to said scheduler circuit, and wherein said gate control circuit is configured to activate a control connection of at least a first switch in dependence on a control signal from said scheduler

circuit.

Claim 56 (new). The switching device according to claim 55, which comprises at least one auxiliary voltage source having an input side connected to said first terminal or said second terminal, and wherein said auxiliary voltage source is connected between a first supply connection with a first supply potential and a second supply connection with a second supply potential and carries an auxiliary supply potential for supplying said gate control circuit.

Claim 57 (new). The switching device according to claim 38, which comprises a voltage sensing device having an input side coupled to said first and second terminals and an output side, and wherein said voltage sensing device is configured to sense a differential voltage between said first and second terminals and to output a signal derived from the differential voltage at said output side.

Claim 58 (new). The switching device according to claim 57, wherein said output side of said voltage sensing device includes a first output carrying a signal derived from an amount of the differential voltage measured between the first and second terminals, and a second output carrying a signal derived from a leading sign of the differential voltage measured between the first and second terminals.

Claim 59 (new). The switching device according to claim 57, wherein said voltage sensing device includes a differential amplifier with a high common-mode rejection on the input side, said differential amplifier having an input receiving the differential voltage, and wherein a comparator is connected at an output of said differential amplifier for comparing an output signal of the differential amplifier with a reference potential.

Claim 60 (new). The switching device according to claim 57, which comprises a scheduler circuit configured to control a function of said switching controller and of said transfer gate, said scheduler circuit having an input side connected to output terminals of said voltage sensing device and/or said current sensing device and

evaluates the measured currents and voltages.

Claim 61 (new). The switching device according to claim 38 configured as an integrated switching device.

Claim 62 (new). A motor vehicle electrical network, comprising:

at least two energy accumulators;

an integrated starter-generator mechanically coupled to an internal combustion engine, said starter-generator, in a generator mode, charging at least one of said energy accumulator and, in a motor mode, configured to be driven by way of energy stored in at least one of said energy accumulators;

a bidirectionally operable AC/DC converter connected between said energy accumulators and said integrated starter-generator; and

a switching device according to claim 38 connected between a DC terminal of said AC/DC converter and each of said energy accumulators.

Claim 63 (new). The motor vehicle electrical system according to claim 62, wherein said energy accumulators are physically separated from one another in operation.

Claim 64 (new). The motor vehicle electrical system according to claim 62, which comprises at least one switching device for physical separation of said energy accumulators.

Claim 65 (new). The motor vehicle electrical system according to claim 62, wherein said energy accumulators include a first energy accumulator embodied as an accumulator and a second energy accumulator embodied as a double-layer capacitor.

Claim 66 (new). The motor vehicle electrical system according to claim 65, wherein said switching device is connected between said double-layer capacitor and said DC terminal of said AC/DC converter.

Claim 67 (new). The motor vehicle electrical system according to claim 62, which comprises an intermediate circuit capacitor for buffering a switched voltage connected between said DC terminal of said AC/DC converter and said at least one switching device.

Claim 62 (new). A method of operating a switching device, comprising:

providing a switching device according to claim 38, wherein the switching controller and the transfer gate are intially open;

wherein a first potential at an input of the switching device is greater than a second potential at an output of the switching device;

closing the switching device by applying a first control signal to the switching device;

initially operating the switching controller in a switching controller mode to reduce a differential voltage dropping across the switching device; and

when the differential voltage is largely balanced out, completely closing the switching controller and switching the transfer gate on.

Claim 63 (new). The method according to claim 62, which comprises measuring and evaluating the differential voltage.

Claim 64 (new). The method according to claim 62, which comprises, based on a measured differential voltage, generating a first voltage sensing signal as a measure of an amount of the differential voltage and generating a second voltage sensing signal as a measure for a polarity of the differential voltage.

Claim 65 (new). The method according to claim 62, which comprises equalizing a charge between the output and the input of the switching controller by operating the switching controller in switching controller mode, provided a first voltage measurement signal exhibits a voltage difference that is greater than an upper

threshold value.

Claim 66 (new). The method according to claim 62, which comprises selecting a transistor coupled to the input as a switching controller transistor and operating the transistor coupled with the output in a static switched-on state if a second voltage sensing signal indicates a positive polarity of the differential voltage.

Claim 67 (new). The method according to claim 62, which comprises carrying out the following steps to iteratively in switching controller mode:

measuring a load current through the controlled path of a transistor connected to the input and through an inductor;

monitoring a measured load current against an upper limit value;

switching the transistor off when the load current exceeds the upper limit value;

monitoring the measured load current against a lower limit value; and

switching the transistor back on when the charge current drops below the limit value.

Claim 68 (new). The method according to claim 62, which comprises, when the first voltage measurement signal exhibits a voltage difference below a lower threshold value, permanently switching on the transistor of the switching controller connected to the input and/or switching on the transfer gate connected in parallel with the switching controller.

Claim 69 (new). The method according to claim 62, which comprises, when a charge time of an inductor of the switching controller falls below a predetermined time limit value in switching controller mode, permanently switching on the transistor of the switching controller connected to the input and/or switching on the transfer gate connected in parallel with the switching controller.

Claim 70 (new). The method according to claim 62, which comprises, based on the measured differential voltage, detecting with the device when the differential voltage is small enough or when the charge equalization between the output and the input has progressed far enough respectively to perform a permanent closure of the switching controller and switch over to the transfer gate.

Claim 71 (new). The method according to claim 62, which comprises monitoring circuit parts of the switching device for respective correct functioning and/or monitoring for errors in a functional sequence, and wherein, in an event of a detected error, not switching on the switching device.

Claim 72 (new). The method according to claim 62, which comprises transferring a current switching state of the switching device in each case by way of a status signal to an external control unit and displaying the current switching state at the external control unit.